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(71) Applicant *(for all designated States except US)*: **ADVENTURES PLUS PTY LTD** [AU/AU]; Suite 2, 5th Floor, 241 Adelaide Street, Brisbane, QLD 4000 (AU).

(72) Inventor; and
(75) Inventor/Applicant *(for US only)*: **TUFFLEY, Mark** [AU/AU]; Suite 2, 5th Floor, 241 Adelaide Street, Brisbane, QLD 4000 (AU).

(74) Agent: **CULLEN & CO**; Level 26, 239 George Street, Brisbane, QLD 4000 (AU).

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(54) Title: A NUTRIENT BEVERAGE

(57) Abstract: A beverage which comprises a fruit juice product, a supplement selected from the group consisting of vitamin supplements and mineral supplements or combinations thereof, a flavoring agent, an additive selected from the group consisting of an edible acid and an edible salt or combinations thereof, and water, the pH of the beverage being least about 5.0. The juice is found to be of benefit when recovering from surgery, illness such as glandular fever and chronic fatigue conditions.

A NUTRIENT BEVERAGE

FIELD OF THE INVENTION

The present invention relates to carbonated and non-carbonated beverage compositions and beverage concentrates adapted for oral administration which include vitamins, minerals and optionally other supplements.

BACKGROUND ART

Vitamin and mineral supplements are well known. Such supplements may be in the form of tablets or capsules. A disadvantage of capsules or tablets is that they are unsuitable for those who have difficulty swallowing. Also, there is a delay between ingestion and the active ingredients entering the blood stream. This is caused by the time taken for the tablet or capsule to dissolve in the stomach. To overcome these difficulties, effervescent tablets have been proposed. Such tablets are typically designed to be added to a glass of water. However, the dissolved effervescent tablets suffer from palatable problems. This is because many vitamins and/or minerals have an unpleasant flavor. Although flavoring and masking agents are typically employed in an attempt to make these supplements palatable, they are still not considered to be sufficiently palatable for a person to drink them recreationally.

It would therefore be desirable to be able to formulate a vitamin and mineral supplement in the form of a beverage which has an appealing taste.

An advantage of providing a beverage is that after exercise it is desirable to replenish not only fluids but also nutrients. Beverages designed to facilitate rehydration are known. However, such beverages have a very low pH, typically about 2.8 to about 3. The beverages are formulated with such a low pH to make them palatable. Humans prefer acidic beverages and this is exemplified by the fact that wines and beers all have a pH of below about 3.4. A disadvantage of such a low pH is that they have an erosive effect on teeth. This leads to erosive and abrasion lesions of the teeth. Saliva can have a buffering affect on the acids. However, saliva levels can be depleted when an individual becomes dehydrated such as after exercise, and this is when these

types of beverages are most often consumed.

There have been a number of attempts to overcome the difficulties associated with dental erosion. These approaches center around providing additives to the beverage to combat the erosion. An example of such an additive is simply providing a calcium supplement. Such additives may however have an adverse affect on the taste. Further, the beverage still has a low pH. A low pH may irritate the stomach and cause gastric problems. Also, acidic drinks can exacerbate a condition known as metabolic acidosis which is found in strenuous physical activity. Again, it is after activity that such drinks are most often consumed in large amounts.

OBJECT OF THE INVENTION

It is therefore an object of the present invention to provide a beverage, or a concentrate therefore which may at least partially overcome the above disadvantages or provide the public with a useful choice.

According to a first broad form of the invention there is provided a beverage which comprises a fruit juice product, a vitamin and/or mineral supplement, a flavoring agent, an edible acid and/or an edible salt thereof and water, wherein the pH of the beverage is at least about 5.0.

The fruit juice product may be in a single-strength, ready-to-serve, drinkable form. In this case, the beverage may contain between about 5 to about 50 parts per 100 by volume fruit juice. Typically the beverage may contain between about 15 to about 25 parts by volume fruit juice. As fruit juice has a pH of about 3.0 to about 3.5 it is preferred that the amount of fruit juice in the beverage does not exceed about 50 parts by volume. Fruit juice products may also include concentrated products which are referred to as "nectars". Nectars usually have added sugars or artificial sweeteners or carbohydrate substitutes. Alternatively, the fruit juice product may be in the form of a concentrate. Concentrates are products which, when diluted with the appropriate amount of water, form drinkable fruit juice beverages. Powdered or granulated fruit juice concentrates may also be included in the beverage of the invention.

The nature and level of the vitamin and/or mineral supplement may

vary according to the requirements of the end user. For example, a beverage intended for an endurance athlete may include higher levels of some ingredients than a beverage primarily intended for recreational use or vice versa.

Typically, the beverage will include conventional vitamin components, most preferably in sufficient amounts such that the total daily dose contains the recommended daily allowance (RDA) of one or more of such vitamin components for adults. Conventional vitamin components include vitamin A (eg. as the acetate or palmitate), vitamin D (eg. as cholecalciferol), vitamin B_1 (eg. as thiamine mononitrate), vitamin B_2 (eg. as riboflavin), vitamin B_6 (eg. as pyridoxine hydrochloride), vitamin B_{12} (eg. as cyanocobalamin), vitamin C (eg. as ascorbic acid or sodium ascorbate), vitamin D, vitamin E (eg. as the d1-alpha tocopheryl acetate), folic acid and niacin. Optionally, additional vitamins, such as vitamin K (eg. as phytonadione), biotin, and pantothenic acid (eg. as calcium pantothenate) may also be included. The beverage may also include the minerals manganese, iron, molydenum, phosphorous, magnesium, calcium, selenium, boron, copper, and molydenum. These minerals are typically provided in a water soluble, bioavailable form.

A unit dosage of the beverage of about 500ml would typically contain about one half the recommended daily dosage of the vitamins and minerals.

The beverage may also include other agents believed to be beneficial to human health such as bioflavonoids. The beverage may also contain carbohydrates such as glucose.

The beverage may also contain a flavoring agent. Flavoring agents are well known in the art. Preferred flavoring agents are those which are suitably used for masking and/or flavoring the effervescent type vitamin and mineral supplements as described above. These are well known in the art. The relative amount of the flavoring agent will vary, depending upon the nature of the agent, the desired flavor, the amount required to mask any unpleasant tasting vitamins or minerals, and the flavor of the fruit juice.

The beverage may also contain an edible acid in an amount such that the pH of the beverage is at least about 5.0. Edible acids are weak acids and

thus have a buffering capacity. In this way the beverage may be buffered to about the desired pH. Suitable acids are carboxylic acids and include citric, tartaric, malic, succinic, adipic and fumaric acid. The acids may be present as the free acid, an acid salt or a mixture thereof. Preferably the acid is present at least partially in the form of a sodium or potassium salt.

The beverage may be formulated as either a still or a carbonated drink.

The beverage may also be in the form of a concentrate which may be mixed with water. The concentrate may be in a liquid form, in which case the fruit juice product is a fruit juice concentrate or a powdered or granulated form in which the fruit juice product is in a dehydrated form. The dry concentrate may also be formulated without the fruit juice product for admixture with a dilute fruit juice.

The dry concentrate may be provided in a free flowing form and a user may measure out a predetermined amount for adding to a predetermined amount of water. Alternatively, the free flowing concentrate may be packaged in satchels. The concentrate may also be formulated into a tablet and suitably the tablet includes an alkali metal bicarbonate and/or carbonate so as to form an effervescent couple with an edible carboxylic acid. The bicarbonate may also react with an edible carboxylic acid to produce a buffer. For example, sodium bicarbonate will react with citric acid to produce sodium citrate.

In another form of the invention there is provided a beverage concentrate for mixing with water, the concentrate comprising a dehydrated fruit juice product, a vitamin and/or mineral supplement, a flavoring agent, an edible acid and optionally an alkaline carbonate, the amount of fruit juice powder and edible acid being in an amount such that when the concentrates are added to a predetermined amount of water, the pH of the solution is at least about 5.0.

Typically, the concentrate is added to water. However, the concentrate may also be added to fruit juice diluted with water. In this case the above composition may be modified to exclude the dehydrated fruit juice.

The beverage or concentrate of any of the above forms of the invention may also include an electrolyte supplement. Electrolytes are often included in

drinks intended for consumption by athletes. Such electrolytes include potassium, sodium, calcium, magnesium, chloride, bicarbonate, phosphate and sulfate.

The beverage may also contain a sweetener which may be a natural sweetener such as sugar or an artificial sweetener. Such sweeteners are well known in the beverage art. A preferred sweetener is honey or brown sugar.

BEST MODE

By way of example only, a beverage of the present invention may be formulated according to the following formula:

Whole fruit juice	200ml
Vitamin A	10000 IU
Vitamin D	360 IU
Vitamin B_1	20mg
Vitamin B_2	5mg
Vitamin B_6	10mg
Vitamin B_{12}	5µg
Vitamin C	150mg
Vitamin E	10mg
Nicotinamide	50mg
Calcium-d-pantothenate	0.25mg
Iron (as carbonate)	1.25mg
Magnesium (as glycerophosphate)	5.0mg
Calcium (as glycophosphate)	50.0mg
Phosphorous	45.0mg
(as calcium and magnesium glycerophosphate)	
Manganese (as sulphate)	0.5mg
Sodium bicarbonate	1.76g
Anhydrous sodium citrate	0.63g
Citric acid	0.72g
Tartaric acid	0.89g
Magnesium glycinate	75mg
Manganese glycinate	2.5mg

Malic acid	300mg
Thiamin mononitrate	25mg
Vitamin B_6	25mg
Brown sugar	2-5g
Filtered water	to 1 000ml

The pH of the above solution is about 5.3.

The beverage formulated according to the above formula is surprisingly and unexpectedly palatable considering the pH is significantly higher than other beverages on the market. By way of example, popular beverages such as Gatorade, Powerade and Iso-sport have a pH of 2.9, 2.9 and 3.0 respectively.

The beverage of the present invention has a pH which will cause significantly less dental erosion than those beverages having a pH of about 3.0. Further as the level of hydrogen ions is much lower, the beverage of the invention is less likely to cause gastric upsets as a result of excessive acid. Further, the beverage may be able to counter metabolic acidosis as found in strenuous physical activity.

It will be appreciated that the relative amounts of vitamins, minerals and electrolytes in the above formula may be varied according to anticipated use for example whether to be used as a recreational supplement or by an endurance athlete. Still further, it is believed that the wide range of vitamins, minerals and other micro-nutrients in the above formula may enhance physical performance under stress or fatigue conditions.

The juice is found to be of benefit when recovering from surgery, and illness such as glandular fever and chronic fatigue conditions.

In the present specification, the terms "comprising", "comprise" or "comprises" and terms such as "include" and derivatives thereof are understood to include the stated integers or elements but not to the exclusion of any other element or integer or group of elements or integers.

It will also be appreciated that various modifications and changes may be made to the invention as described without departing from the spirit and scope thereof.

CLAIMS

1. A beverage which comprises a fruit juice product, a supplement selected from the group consisting of vitamin supplements and mineral supplements or combinations thereof, a flavoring agent, an additive selected from the group consisting of an edible acid and an edible salt or combinations thereof, and water, the pH of the beverage being least about 5.0.

2. The beverage of claim 1 which contains between about 5 to about 50 parts per 100 by volume fruit juice.

3. The beverage of claim 2, which contains between about 15 to about 25 parts by volume fruit juice.

4. The beverage of claim 1 wherein the fruit juice product comprises a nectar or a concentrate.

5. The beverage of claim 4, wherein the fruit juice product comprises a solid.

6. The beverage of claim 1, wherein the vitamin supplements are present in an amount equivalent to the recommended daily allowance.

7. The beverage of claim 6, wherein the vitamin supplements are selected from vitamin A (eg. as the acetate or palmitate), vitamin D (eg. as cholecalciferol), vitamin B, (eg. as thiamine mononitrate), vitamin B.2 (eg. as riboflavin), vitamin B6 (eg. as pyridoxine hydrochloride), vitamin B12 (eg. as cyanocobalamin), vitamin C (eg. as ascorbic acid or sodium ascorbate), vitamin D, vitamin E (eg. as the d1-alpha tocopheryl acetate), folic acid and niacin. Optionally, additional vitamins, such as vitamin K(eg. as phytonadione), biotin, and pantothenic acid (eg. as calcium pantothenate) may also be included.

8. The beverage of claim 1, wherein the mineral supplements comprise manganese, iron, molydenum, phosphorous, magnesium, calcium, selenium, boron, copper, and molydenum.

9. The beverage of claim 8,wherein the mineral supplements are provided in a water soluble or bioavailable form.

10. The beverage of claim 1, wherein the beverage contains

bioflavonoids.

11. The beverage of claim 1, containing carbohydrates.

12. The beverage of claim 1, wherein the additive is an edible acid which is present in an amount such that the pH of the beverage is at least about 5.0.

13. The beverage of claim 12, wherein the edible acid comprises carboxylic acids including citric, tartaric, malic, succinic, adipic and fumaric acid.

14. The beverage of claim 1 comprising a dissolved gas to form a carbonate to drink.

15. The beverage of claim 1, in the form of a concentrate.

16. The beverage of claim 1, in a solid form.

17. A beverage concentrate for mixing with water, the concentrate comprising a dehydrated fruit juice product, a vitamin and/or mineral supplement, a flavoring agent, an edible acid and optionally an alkaline carbonate, the amount of fruit juice powder and edible acid being in an amount such that when the concentrates is added to a predetermined amount of water, the pH of the solution is at least about 5.0

18. The beverage of claim 1, comprising an electrolyte supplement including supplement selected from the group consisting of potassium, sodium, calcium, magnesium, chloride, bicarbonate, phosphate and sulfate.

19. The beverage of claim 1 comprising a sweetener.

20. The beverage of claim 1 comprising

Whole fruit juice	200ml
Vitamin A	10000 IU
Vitamin D	360 IU
Vitamin B_1	20mg
Vitamin B_2	5mg
Vitamin B_6	10mg
Vitamin B_{12}	5μg

Vitamin C	150mg
Vitamin E	10mg
Nicotinamide	50mg
Calcium-d-pantothenate	0.25mg
Iron (as carbonate)	1.25mg
Magnesium (as glycerophosphate)	5.0mg
Calcium (as glycophosphate)	50.0mg
Phosphorous	45.0mg
(as calcium and magnesium glycerophosphate)	
Manganese (as sulphate)	0.5mg
Sodium bicarbonate	1.76g
Anhydrous sodium citrate	0.63g
Citric acid	0.72g
Tartaric acid	0.89g
Magnesium glycinate	75mg
Manganese glycinate	2.5mg
Malic acid	300mg
Thiamin mononitrate	25mg
Vitamin B_6	25mg
Brown sugar	2-5g
Filtered water	to 1 000ml,

the pH of the above solution being about 5.3.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00763

A. CLASSIFICATION OF SUBJECT MATTER

Int. Cl. [7]: A23L 2/02, A23L 2/385, A23L 2/52

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC: A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
WPIDS, FSTA, ChemAbs: fruit, juice, vitamin, mineral, supplement, additive, pH

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 92/05711 A (THE PROCTOR & GAMBLE COMPANY) 16 April 1992 whole of document	1-20
X	GB 1 188 871 A (SOLAGRUM S.p.A.) 22 April 1970 whole of document	1-13, 15-20
E, X	WO 01/50889 A (SEMPER FOODS AB) 19 July 2001 whole of document	1-13, 18-20

[X] Further documents are listed in the continuation of Box C [X] See patent family annex

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"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&" document member of the same patent family

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Name and mailing address of the ISA/AU

AUSTRALIAN PATENT OFFICE
PO BOX 200, WODEN ACT 2606, AUSTRALIA
E-mail address: pct@ipaustralia.gov.au
Facsimile No. (02) 6285 3929

Authorised officer

GARETH COOK
Telephone No : (02) 6283 2541

INTERNATIONAL SEARCH REPORT

International application No.
PCT/AU01/00763

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
P, X	US 6 086 927 A (FRIELICH *et al*) 11 July 2000 whole of document, example 6	1-13, 18-20
A	WO 97/04661 A (AKPHARMA INC) 13 February 1997 whole of document	

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/AU01/00763

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report		Patent Family Member					
WO	92/05711	AU	87615/91	AU	32282/99	MX	91 01398
		AU	32856/95	EP	551 398	NZ	240 003
		AU	8314898	HK	1 006 136	US	5 108 761
WO	97/04661	AU	65073/96	IL	122 986	US	5 869 119
		BR	9609876	NZ	313 085	ZA	9606241
		EP	849 996	US	5 665 415		

END OF ANNEX